AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An acoustic wave sensor comprising:

a substrate formed from a piezoelectric crystal with a crystallographic orientation, said substrate having a sensing surface and a reference surface, said reference surface being opposite from said sensing surface, said sensing surface adapted to be immersed in an environment containing a measurand of interest; and

a pair of electrodes deposited upon said substrate reference surface, said electrodes separated by a gap and oriented upon said reference surface relative to said crystallographic orientation of said substrate such that, upon said electrodes generating ~~operative to generate~~ a lateral electric field therebetween, said lateral electric field ~~inducing~~ induces only a transverse shear mode acoustic wave within said substrate.

2. (Original) The sensor according to claim 1 wherein said substrate piezoelectric crystal is one of the group of quartz, langatate, langasite, langanite, lithium tantalate and lithium niobate.

3. (Original) The sensor according to claim 2 wherein said substrate is formed from an AT cut quartz .

4. (Cancelled)

5. (Currently Amended) The sensor according to claim [[4]] 3 wherein said electrodes are formed with parallel facing edges that also are parallel with [[the]] a crystallographic x-axis of said substrate such that upon excitation said electrodes generate an electric field that excites only transverse shear mode acoustic waves.

6. (Original) The sensor according to claim 5 wherein said electrodes are formed from one of the group of gold, platinum, palladium, silver, copper and aluminum.

7. (Original) The sensor according to claim 6 further including an adhesive

layer formed from one of the group of chromium, zirconium, and titanium disposed between said electrodes and said reference surface of said substrate.

8. (Original) The sensor according to claim 7 wherein said gap between said pair of electrodes is within the range of 1.0 to 4.0 mm.

9. (Original) The sensor according to claim 8 wherein said substrate is circular in shape with a diameter within a range of 20 to 30 mm and a thickness within a range of 0.3 to 1.0 mm.

10. (Original) The sensor according to claim 9 wherein said electrodes have a thickness within the range of 1,500 to 2,500 Å and said adhesive layer has a thickness within the range of 50 to 150 Å.

11. (Original) The sensor according to claim 9 wherein said electrodes have a thickness that is less than 1,500 Å and said adhesive layer has a thickness that is less than 150 Å.

12. (Original) The sensor according to claim 8 further including a layer of a sorbent material deposited upon said sensing surface, said sorbent material being selected to absorb a measurand contained within the environment being sensed, said absorbed measurand changing an operative characteristic of the sensor such that the change in said operative characteristic can be correlated with said measurand.

13. (Original) The sensor according to claim 12 wherein said operative characteristic is the resonant frequency of the sensor.

14. (Original) The sensor according to claim 8 wherein said sensing surface is bare.

15. (Currently Amended) A method for fabricating an acoustic wave sensor comprising the steps of:

(a) providing a piezoelectric crystal;

(b) forming the crystal into a substrate having a crystallographic orientation, the substrate including ~~that includes~~ a reference surface and a sensing surface opposite from the reference surface, the sensing surface adapted to be immersed in an environment containing a measurand of interest; and

(c) depositing a pair of electrodes upon the reference surface of the sensor substrate, the electrodes separated by a gap and oriented upon the reference surface relative to the crystallographic orientation of the substrate such that, upon the electrodes generating ~~operative to generate~~ a lateral electric field therebetween, the lateral electric field ~~indueing~~ induces only a transverse shear mode acoustic wave within the substrate.

16. (Cancelled)

17. (Cancelled)

18. (Currently Amended) An apparatus for measuring a characteristic of an environment comprising;

an acoustic wave sensor having a piezoelectric substrate formed from one of the group of quartz, langatate, langasite, langanite, lithium tantalate and lithium niobate, said substrate having a crystallographic orientation, the substrate also having a reference surface and a sensing surface opposite from said reference surface, said sensing surface adapted to be immersed in an environment that contains a measurand, and pair of electrodes deposited upon said reference surface of said substrate with said electrodes oriented relative to said crystallographic orientation of said substrate such that, upon said electrodes generating a lateral electric field therebetween, the lateral electric field induces only a transverse shear mode acoustic wave within said substrate;

a variable voltage supply electrically connected to said sensor electrodes and operative to cause said electrodes to generate a lateral electric field therebetween that produces transverse shear mode acoustic waves within said substrate that extend into said environment, said variable voltage supply having a variable frequency and being operative to sweep through a predetermined frequency range; and

a device electrically connected to said sensor and operative to detect the resonance frequency of the sensor, said device being further operative to detect shifts in the resonant frequency caused by said measurand deposited upon said sensing surface varies and to correlate said resonant frequency shift with said measurand.

19. (Original) The apparatus according to claim 18 further including an adhesive layer formed from one of the group of chromium, zirconium and titanium deposited between said substrate reference surface and said electrodes.

20. (Original) The apparatus according to claim 19 wherein said environment is a liquid and said measurand is the viscosity of said liquid.

21. (Original) The apparatus according to claim 19 wherein said environment is a liquid and said measurand is the relative permittivity of said liquid.

22. (Original) The apparatus according to claim 19 wherein said environment is a liquid characteristic and said measurand is the conductivity of said liquid.

23. (Previously Presented) The method according to claim 15 wherein step (a) includes selecting the piezoelectric crystal from the group of quartz, langatate, langasite, langanite, lithium tantalate and lithium niobate.

24. (Previously Presented) The method according to claim 15 further including between steps (b) and (c), depositing an adhesive layer upon the reference surface of the sensor substrate.

25. (Previously Presented) The method according to claim 15, wherein the electrodes formed in sep (c) are formed one of the group of gold, platinum, palladium, silver, copper and aluminum and further wherein the electrodes are deposited upon the reference surface of the sensor substrate and over the adhesive layer.